T&S LIMITED

**TORRANCE & SONS LIMITED, BITTON, BRISTOL, ENGLAND.**
**TEL. 0275 88 2118.**

# BATCH ATTRITORS

ATTRITOR

# Laboratory pilot model 1S Attritor


The 1S Attritor is a handy bench model, which in addition to the determination and control of production formulae on a large scale, can also render excellent service as a small production unit.

The drive with infinitely variable speed transmission is completely enclosed in the mill. Discharge is by means of a valve in the base of the jacketed vessel. The grinding media can be removed by tipping the vessel.

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## Advantages of Attritor processing

**Safe operation.** Attritors represent the safest fine-grinding equipment available for hazardous operations. For example, volatile and inflammable materials can be handled with minimum fire hazard.

**Efficient handling** of processed materials is made possible by the pumping system incorporated in the larger units.

**Easy cleaning.** All Attritors are easily cleaned, with minimum 'down time'.

**Fine dispersions** can be obtained in a particle size range of 1 micron or less at high concentrations without trapping air.

**Shorter grinding times.** Grinding times are considerably reduced to one tenth or even less than those required in conventional equipment.

**Low power consumption.** Power is used only for dispersion or grinding. No heavy components have to be raised or moved continuously, and the operation is simple and relatively quiet.

**Minimum floor space and installation costs.** No special foundations are required. Attritors can be re-located at any time, without difficulty. Maintenance costs are also low.

**Reliable temperature control.** Grinding vessels are jacketed, making it possible to maintain a reliable and responsive temperature control during operation.

**Continuous inspection and control.** Material processed can be inspected continuously, and additions or corrections can be made at any time without stopping the machine.

## 12 important features of the Attritor

- **Excellent grinding.**
- **Uniform dispersion.**
- **Very short grinding times.**
- **Rational working system.**
- **Easy to operate.**
- **Low power consumption.**
- **Easy cleaning.**
- **Minimum floor space.**
- **Absolute reliability.**
- **Quiet in operation.**
- **Automation possible.**
- **Large field of application.**

## Mechanical alloying and other metallurgical applications

Torrance Attritors can produce combinations of metals which cannot be achieved by melting or by conventional powder metallurgy.

They can help you create entirely new metallic materials with unique properties.

And they produce controlled, highly uniform dispersions in a shorter time and on a larger scale.

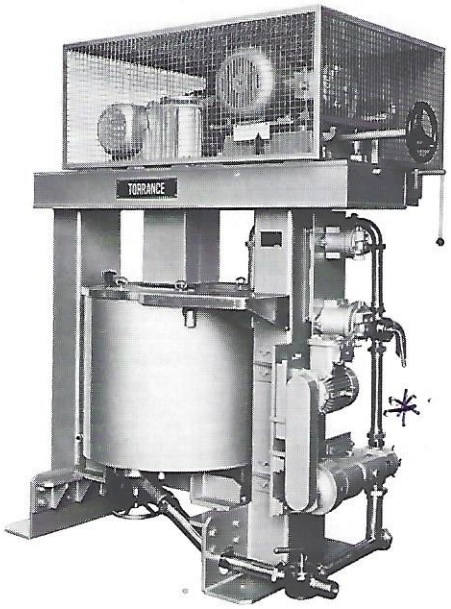
## Intermediate size 15S Attritor


This Attritor is useful for the rapid processing of intermediate and smaller production quantities.

It is equipped with a jacketed steel grinding vessel, and is fitted with a special valve to allow easy discharge.

The 15S Attritor has variable speed transmission.

## Production 100SM and 30SM Attritors




The 100SM Attritor has a jacketed stainless steel grinding vessel. The built-in pumping and circulating system, with quick release couplings for easy cleaning, facilitates recirculation during processing in order to shorten dispersing time and increase the volume of process material. It can also be used for charging and discharging the vessel.

The 30SM Attritor has twice the capacity of the 15S and can be fitted with a built-in pumping and circulating system if required.

## Large scale production 200S Attritor


The 200S is the largest Attritor in the Torrance range, and is specifically designed for fast dispersing and grinding of larger batches to the high standards expected in modern production methods and techniques.

The agitator speed is controlled by a two-speed motor. The stainless steel grinding vessel is jacketed to allow temperature control, and the whole unit is carried on trunnions and fitted with hand operated mechanical tilting gear.

A stainless steel pump in the system recirculates in either direction and also discharges.

## Experimental processing with Attritor equipment

Attritor processing covers grinding, dispersing and fine mixing

Torrance & Sons Limited maintain a fully equipped laboratory and pilot plant, with all the necessary facilities to carry out small, intermediate or production-size runs for experimental purposes.

These experimental dispersions can be made with materials sent to us. The finished dispersions are returned, together with a report on the formulation details, grinding times, etc. We should be advised about the required fineness and, possibly, have samples representing the desired end result.

The most satisfactory equipment for experimental runs is the batch operation **Pilot Laboratory 1S Attritor** which requires approximately 1.62 litres of liquid slurry for each dispersion. This volume is convenient to handle, and the results obtained can easily be scaled to production-size operations.

For continuous grinding, experimental runs are carried out either in the **Torrance Continuous Mill** or in the Pilot Laboratory 1S Attritor. The least quantity of experimental material needed to obtain preliminary results is with the Pilot Laboratory 1S Attritor; such data can be easily scaled up for Continuous Attritor processing.

**For circulation grinding, the model 1Q is available.** A three to five gallon quantity is suitable. Preliminary runs in the 1S Attritor are helpful prior to the 1Q trials: such data will assist in estimating the processing time, and in addition, evaluate the particular advantage gained by the circulation process.

Various sizes and types of grinding media are available — carbon steel, steatite and ballotini. The type of processing, contamination, tolerance, and particle size requirement will guide the selection.

Your technical representatives are welcome to witness or assist in making experimental dispersions.

Arrangements can also be made for trial runs on production-size units.

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| Technical Data | 1S | 15S | 30SM | 100SM | 200S |
|---|---|---|---|---|---|
| Total vessel volume litres | 5.73 | 96 | 198 | 464 | 1159 |
| **Advised mill base capacity (litres)** | | | | | |
| Using steatite grinding charge | 1.62 | 27 | 56 | 156 | 424 |
| Using steel grinding charge | 1.62 | 24 | 49 | 167 | 403 |
| **Mill base thinned out (litres)** | | | | | |
| Using steatite grinding charge | 2.65 | 45 | 92 | 244 | 550 |
| Using steel grinding charge | 2.65 | 52 | 108 | 265 | 639 |
| **Weight of grinding charge (kilos)** | | | | | |
| Steatite grinding charge | 6 | 104 | 200 | 391 | 1106 |
| Steel grinding charge | 18 | 283 | 555 | 1064 | 2899 |
| Power main motor (kw) | 0.37 | 4 | 7.5 | 15 | 45/30 |
| Power pump motor (kw) | | | | 1.5 | 1.5 |
| Required floor space (mm) | 889 x 482 | 1524 x 864 | 1700 x 970 | 2060 x 1236 | 2515 x 1905 |
| Height of machine (mm) | 838 | 2286 | 2250 | 2380 | 2794 |
| **Weight of machine (kilos)** | | | | | |
| Nett | 234 | 1220 | 1700 | 2638 | 4013 |
| Gross | 299 | 1421 | 2000 | 2940 | 4369 |

## How it works

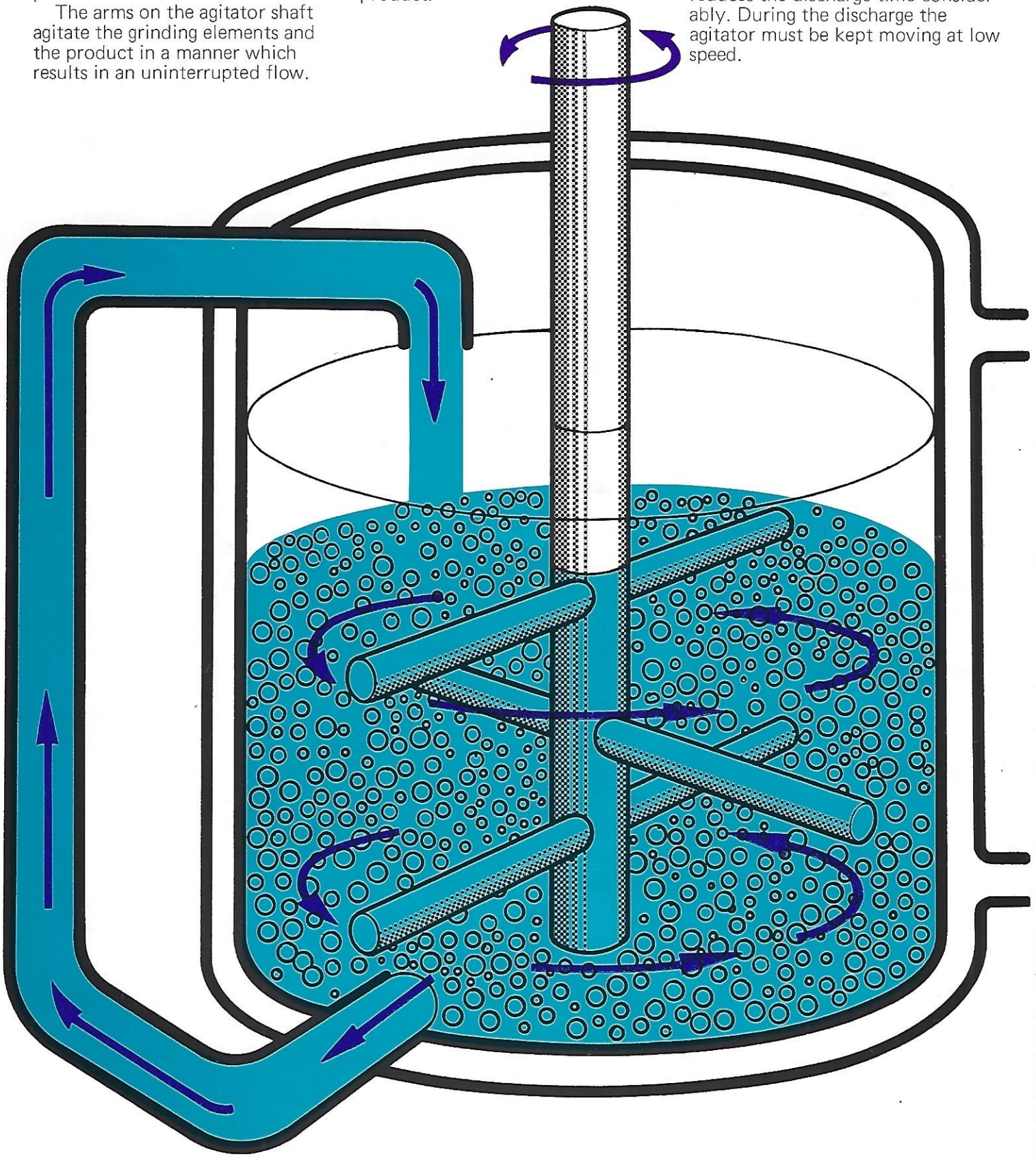
A specially designed agitator revolves inside the stationary grinding vessel which can be either cooled or heated, and which is filled with small grinding elements such as steatite or steel balls. The agitating speed can be varied according to the product and the sizes of the applied grinding elements. The selection of the grinding elements depends upon the character of the product under consideration.

The arms on the agitator shaft agitate the grinding elements and the product in a manner which results in an uninterrupted flow. The grinding elements are encased in a film of the product and move vertically as well as describing a circular path induced by the agitator.

The grinding elements absorb only the limited quantity of kinetic energy necessary to obtain a state of equilibrium between the centrifugal and centripetal forces. Consequently a high grinding effect is obtained producing a uniform fineness of the product.

Batch Attritors can handle products with a viscosity up to the limit of flow. Density of the product in relation to the grinding elements is of secondary importance.

When the desired fineness has been obtained, the paste should be thinned down, enabling discharge through the bottom outlet valve. This principle prevents simultaneous floculation of the product and reduces the discharge time considerably. During the discharge the agitator must be kept moving at low speed.



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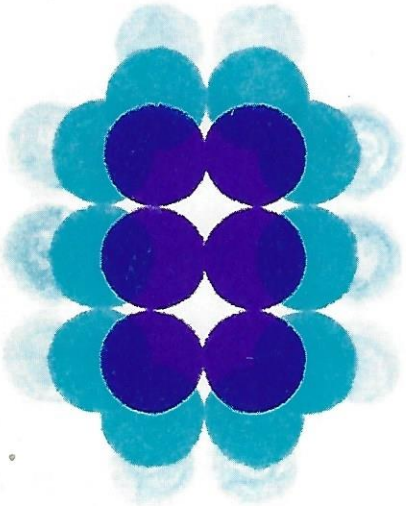
## Applications of the Attritor



All models of the Attritor are suitable for processing:

**Carbon inks.**
**Flexographic inks.**
**Newspaper inks.**
**Rotogravure inks.**
**Paper coating.**
**Textile printing products or colours.**
**Ferrites.**
**Insecticides and herbicides.**
**Paints.**
**Industrial finishes.**
**Cocoa mass.**
**Chocolate.**
**Dyes.**
**Plastisols and Organosols.**
**Metal powders.**
**Chemical products.**
**Cosmetics.**
**Pharmaceuticals.**
**Catalysts.**

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